Támas Roska

Támas Roska was a world-renowned researcher, research supervisor, innovator and dedicated educator. His research focused on the analysis, design, and experimental validation of nonlinear circuits and systems and in particular the cellular neural networks CNN that have been applied in aerospace, biomedical signal processing, medical diagnostics, process control, and several safety critical applications. Tamas Roska was Professor of Information Technology at the Pázmány Péter Catholic University in Budapest. He passed away on June 18, 2014, in Budapest, Hungary at the age of 74.

Professor Roska is most lauded for his breakthroughs in real-time image processing as he phrased it: "The CNN proved to be very useful in partially mimicking the visual pathway, in particular the retina and the visual cortex. Based on our insights, our team was able to develop a new kind of computer." The applications are numerous: real-time image processing tasks in navigation, bionic eyeglasses, collision avoidance of unmanned aerial vehicles, mission-critical operations, etc. Roska's team has also implemented the technology in tactile and auditive applications. "The first visual microprocessors are already on the market and I predict that sensory computers will become ubiquitous. The computer architectures of the future will increasingly be cellular and - perhaps even more interesting - molecular-level computing is emerging as well."

Being born in Budapest in 1940 at the beginning of the world war, he had a difficult youth and adulthood due to the war and the Soviet occupation of his country until 1991. He nevertheless always had an enormously positive attitude towards mankind and nature. As a university student he was always curious and enthusiastic. He was interested in everything of intellectual beauty. He enjoyed his studies and the discovery of the world. His devotion to mathematics and his enthusiastic interest in understanding the secrets of nature were exceptional. He eagerly wanted to understand everything.

After his Diploma of electrical engineering from the Technical University of Budapest in 1964, he obtained in 1973 resp. 1982 the Ph.D., resp. the D.Sc. degree in Hungary. He subsequently held research positions and took courageous initiatives. Since 1982 he performed research at the Computer and Automation Research Institute of the Hungarian Academy of Sciences, was head of the Analogic and Neural Computing Research Laboratory and the Chairman of the Scientific Council. As a young researcher he became engaged with Circuit Theory, the "Queen" of Electrical Engineering, bridging physics i.e. describing the order in real nature, to mathematical models of the creative designer. Logic and mathematics take care of the correctness of the mind. The challenge of 1960's and 70's was to create better and better von Neumann type binary universes in a "chip", i.e. to lay down the principles of design for very large scale circuits applied in computing, control and communication. He became one of the mentors of many talented young researchers. In the late 1980s he organized a doctoral school at SzTAKI. Soon after the fall of the iron curtain in 1992 he assisted the University of Veszprém to launch a Department for Engineer-

ing Informatics, and later in 1998 he accepted the invitation of the Rector of the Pázmány Péter Catholic University to establish as founding Dean an Engineering Faculty (University Department) focusing on Information Technology. The Mission Statement declares that the program will be "human-centered and nature-inspired". It will integrate the field of electrical engineering and information technology with certain areas of life-sciences. This program has attracted many bright students, and received international attention. In 1993 he co-founded the postgraduate Centre for Neuromorphic Information Technology in Budapest.

He was exceptionally intelligent, bright and talented, he was a great scientist, but first of all, he was an extraordinary human being. He radiated optimism and kindness wherever he went. And when in the late 1980's the National Science Foundation (NSF) reopened the possibility to start joint MTANSF research projects, his joint proposal with UC Berkeley was among the first welcome and fruitful initiatives. This project and subsequent projects brought him into intense cooperations with the University of California, Berkeley and the University of Notre Dame, Indiana USA and different European universities. Young researchers from Hungary and all over the world became motivated by the new paradigm, and Tamás became the best known Hungarian scientist in the global community of the IEEE Circuits and Systems Society. He was active in setting up a sequence of CNNA conferences related to the analogic spatial-temporal supercomputing and computational complexity issues. He contributed to the IEEE CAS Society as a member of the Board of Governors and as initiator of the Cellular Nanoscale Networks and Array Computing (CNNAC) Technical Committee. In 2013 the Society recognized him by the prestigious Mac Van Valkenburg Award. His other awards and honours include 2013 Doctor Honoris Causa at KU Leuven, Fellow of the IEEE, Széchenyi Prize, Grand Prize of the "Pro Renovanda Cultura Hingariae", 2002 Bolyai Prize, 1993 Hungarian Cábor Dénes Prize, Member of the Hungarian Academy of Sciences, Member of the Academia Europaea.

He has published more than hundred research papers and four books (partly as a co-author). His seminal paper on the CNN Universal Machine, co-authored with L. O. Chua, has received more than 1000 citations. Dr. Roska is a co-inventor of two US patents from UC Berkeley : the CNN Universal Machine (with Leon O. Chua) and the analogic CNN Bionic Eye (with Frank S. Werblin and Leon O.Chua). During the last 15 years he has received two NSF grants, five ONR grants, two EU Grants and several Hungarian Grants. He was a founding member of two spin-off companies, one in Berkeley and one in Budapest. For 4 years, in Hungary, he was the advisory Chair of the National R&D Program on Information and Communication Technology. In 2005-2007 he was a member of the Advisory Committee of the EU Commissioner in the Commission of Information Society and Media Technologies in Brussels. Roska has always been devoted to these emerging technologies, as well as to 'bionic systems', a new field that has emerged at the crossroads of information technology, electronics, computing and biotechnology.

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